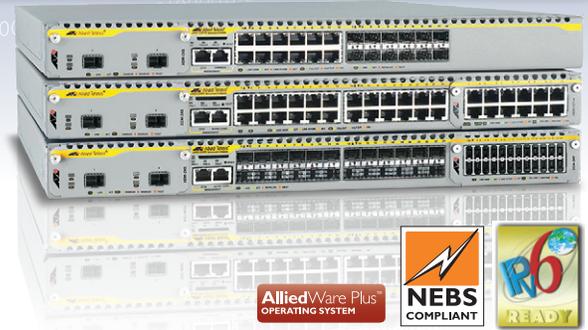# x900 Series

ADVANCED GIGABIT LAYER 3+ EXPANDABLE SWITCHES

The Allied Telesis x900 Series of Layer 3+ switches feature high speed 60Gbps expansion bays, providing a level of port flexibility and application versatility unmatched by any other 1RU Gigabit Ethernet switch on the market.

AlliedWare Plus™ OPERATING SYSTEM

NEBS COMPLIANT

IPv6 READY

Flexible

Allied Telesis x900 Series switches utilize a sophisticated, highly modular design, allowing the network to grow in response to demand. A comprehensive range of hot-swappable copper and fiber expansion modules (XEMs) is available, from 10/100/1000Mbps to 10 Gigabit Ethernet (10GbE). Dual redundant Power Supply Units (PSUs) on x900-24X models are also hot-swappable, adding to the impressive list of high-availability features.

10GbE XEMs provide high speed, high capacity fiber or copper uplinks of 20Gbps to the network core. The new XEM-24T increases port density without consuming additional rack-space.

Reliable

Hot-swappable XEMs, redundant hot-swappable PSUs and replaceable fans ensure no network interruptions during maintenance or reconfiguration.

The x900-24X Series operate with one PSU, and installing a second PSU provides ultimate redundancy. Dual internal PSUs eliminate the need for an external Redundant Power Supply (RPS), thus saving valuable rack space. Built-in redundancy guarantees the continued delivery of essential services. The x900 Series switches also feature front-to-back cooling, making them an ideal choice for data center applications.

Powerful Network Management

Meeting the increased management requirements of modern converged networks, Allied Telesis Management Framework (AMF) automates many everyday tasks including configuration management. The complete network can be managed as a single virtual device with powerful centralized management features. Growing the network can be accomplished with plug-and-play simplicity, and network node recovery is fully zero-touch.

AMF™

Resilient

High availability features such as VCStack™ (Virtual Chassis Stacking) and EPSRing™ (Ethernet Protection Switched Rings) ensure traffic flow continues even during unscheduled outages.

VCStack provides excellent resiliency by creating a single "virtual chassis" from two x900 Series physical devices with XEM-STK modules, providing dedicated high speed stacking links. VCStack creates a highly available system where network resources are spread out across stacked units, reducing the impact should one of the stacked units fail.

VCStack™

Switch ports on different units can be aggregated for excellent high availability. VCStack delivers a resilient solution at a fraction of the cost of a full chassis-based system, and allows management of the stack as a single network node, greatly simplifying management tasks.

EPSRing and 10 Gigabit Ethernet allow several switches to form a high speed protected ring, capable of recovery within as little as 50ms. This feature is perfect when the network design demands high performance and high availability.

EPSRing™

MEF Certified

The Allied Telesis x900 Series has been certified by the Metro Ethernet Forum (MEF) Certification program, which tests products for conformance to the strict requirements of Carrier Ethernet. Specifically, the x900 Series is certified for compliance to MEF 9 and MEF 14 Ethernet Services tests.

CARRIER ETHERNET
MEF Certified Compliant

New Features

» Allied Telesis Management Framework (AMF)
» AT-XEM-24T

Key Features

Allied Telesis Management Framework (AMF)

» Allied Telesis Management Framework (AMF) is a sophisticated suite of management tools that provide a simplified approach to network management. Common tasks are automated or made so simple that the every-day running of a network can be achieved without the need for highly-trained, and expensive, network engineers. Powerful features like centralized management, auto-backup, auto-upgrade, auto-provisioning and auto-recovery enable plug-and-play networking and zero-touch management.

VCStack (Virtual Chassis Stacking)

» Create a VCStack of two units with 60Gbps of stacking bandwidth to each unit. VCStack provides a highly available system where network resources are spread out across stacked units, reducing the impact if one of the units fails. Aggregating switch ports on different units across the stack provides excellent network resiliency.

Virtual Routing and Forwarding (VRF Lite)

» VRF Lite provides Layer 3 network virtualization by dividing a single switch into multiple independent virtual routing domains. With independent routing domains, IP addresses can overlap without causing conflict, allowing multiple customers to have their own secure virtual network within the same physical infrastructure.

Scalable

» Our high speed XEMs provide both copper and fiber connectivity, delivering the ultimate in flexibility. XEM options are:
   » AT-XEM-1XP: 1 x 10GbE (XFP) port
   » AT-XEM-2XP: 2 x 10GbE (XFP) ports
   » AT-XEM-2XS: 2 x 10GbE (SFP+) ports
   » AT-XEM-2XT: 2 x 10GbE (RJ-45) ports
   » AT-XEM-12S: 12 x 100/1000X SFP ports
   » AT-XEM-12T: 12 x 10/100/1000T (RJ-45) ports
   » AT-XEM-12Sv2: 12 x 1000X SFP ports
   » AT-XEM-12Tv2: 12 x 10/100/1000T (RJ-45) ports
   » AT-XEM-24T: 24 x 10/100/1000T (RJ Point 5) ports

All XEMs provide non-blocking performance. XEMs are ideal for aggregating gigabit to the desktop, or for gigabit uplinks from Fast Ethernet switches.

EPSRing™ (Ethernet Protection Switched Rings)

» EPSRing and 10GbE modules allow the x900 Series to form a protected ring with 50ms failover —

perfect for high performance at the core of Enterprise or Provider Access networks.

» SuperLoop Protection enables a link between two EPSR nodes to be in separate EPSR domains, improving redundancy and network fault resiliency.

Industry-leading Quality of Service (QoS)

» Comprehensive low-latency wire-speed QoS provides flow-based traffic management with full classification, prioritization, traffic shaping and min/max bandwidth profiles. Enjoy boosted network performance and guaranteed delivery of business-critical Ethernet services and applications. Time-critical services like voice and video applications take precedence over non-essential services like file downloads, maintaining responsiveness of Enterprise applications.

Control Plane Prioritization (CPP)

» Ensure maximum performance and prevent network outages with CPP. CPP prevents the Control Plane from becoming flooded in the event of a network storm or Denial of Service (DoS) attack, ensuring critical network control traffic always reaches its destination.

sFlow

» sFlow is an industry standard technology for monitoring high speed switched networks. It provides complete visibility into network use, enabling performance optimization, usage accounting/billing, and defence against security threats. Sampled packets sent to a collector ensure it always has a real-time view of network traffic.

Network Access Control (NAC)

» NAC allows unprecedented control over user access, in order to mitigate threats to network infrastructure. The x900 Series use 802.1x port-based authentication in partnership with standards-compliant dynamic VLAN assignment, to assess a user's adherence to network security policies to be assessed, and then either grant access or offer remediation.

Allied Telesis NAC also supports alternatives to 802.1x port-based authentication, such as web authentication to enable guest access, and MAC authentication for end points that do not have an 802.1x supplicant. If multiple users share a port then multi-authentication can be used. A Guest VLAN (also known as Default VLAN) can also be configured to provide a catch-all for users without an 802.1x supplicant.

Terminal Access Controller Access–Control System Plus (TACACS+) Authentication and Accounting

» TACACS+ provides access control and accounting for network users from a centralized server. Authentication is carried out via communication between the local switch and a TACACS+ server to check the credentials of users seeking network access. Accounting enables user sessions and CLI commands to be logged to create an audit trail for user activity.

Optical DDM

» Most modern optical SFP/SFP+/XFP transceivers support Digital Diagnostics Monitoring (DDM) functions according to the specification SFF-8472. This enables various parameters of the transceiver to be monitored in real-time, such as optical output power, temperature, laser bias current and transceiver supply voltage. The x900 Series provides easy access to this information simplifying diagnosing problems with optical modules and fibre connections.

Dynamic Host Configuration Protocol (DHCPv6)

» DHCPv6 is used to dynamically assign IPv6 addresses to hosts from a central location. Acting as DHCPv6 client enables the switch to receive an IPv6 address, and acting as server enables the switch to dynamically allocate IPv6 addresses to hosts. The DHCPv6 server and client both support the Prefix Delegation feature which allocates a whole IPv6 subnet to a DHCP client. The client, in turn, can allocate addresses from this subnet to the hosts that are connected to it.

Virtual Router Redundancy Protocol (VRRPv3)

» VRRPv3 is a protocol for providing device redundancy, by connecting redundant WAN gateway routers or server access switches in an IPv6 network. It allows a backup router or switch to automatically take over if the primary (master) router or switch fails.
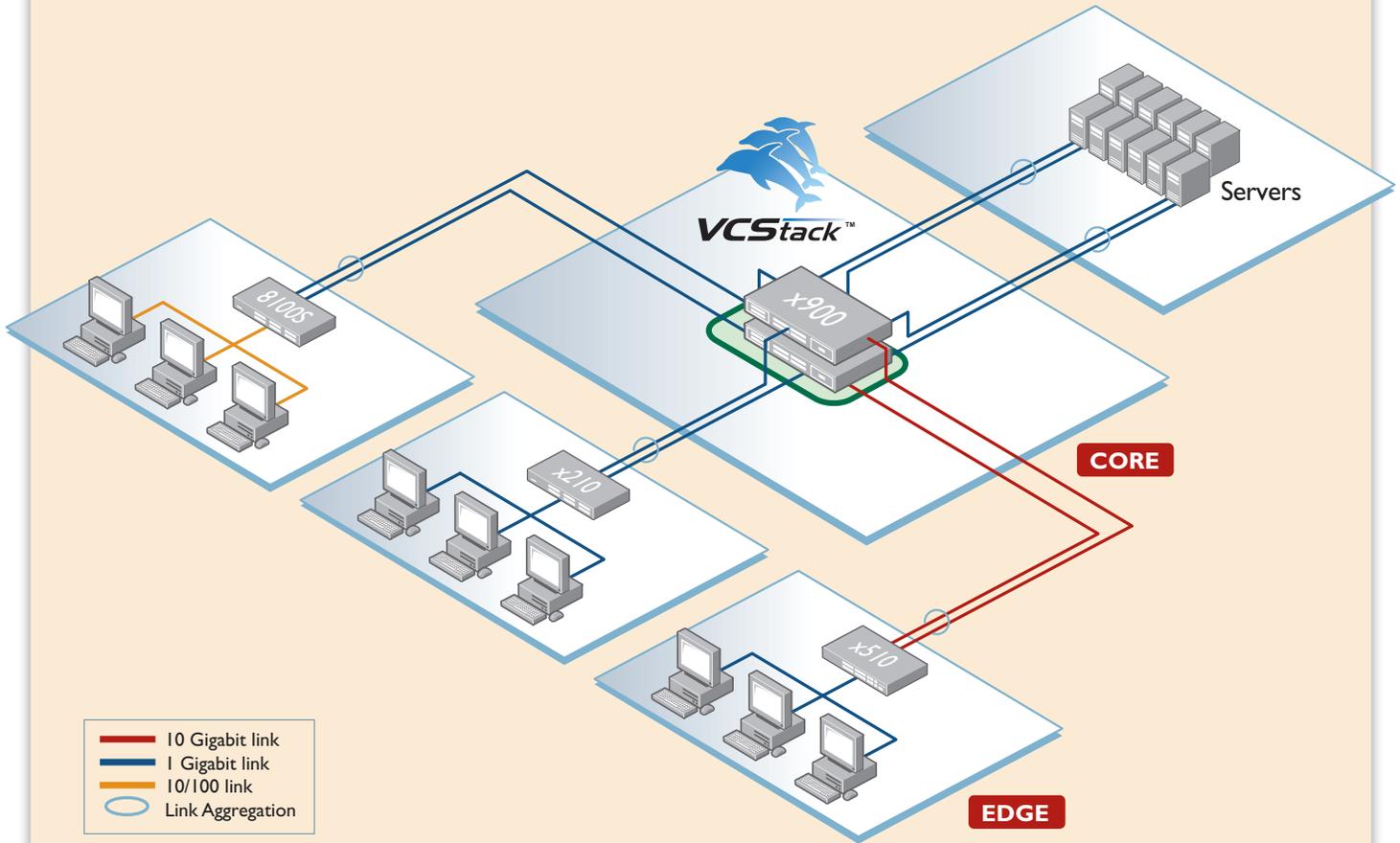
Find Me

» In busy server rooms comprising of a large number of equipment racks, it can be quite a job finding the correct switch quickly among many similar units. The 'Find Me' feature is a simple, visual way to quickly identify the desired physical switch for maintenance or other purposes, by causing its LEDs to flash in a specified pattern.

Key Solution

VCStack (Virtual Chassis Stacking)

Legend:
- **10 Gigabit link** (red)
- **1 Gigabit link** (blue)
- **10/100 link** (orange)
- **Link Aggregation** (oval)

CORE

EDGE

Servers

VCStack: Resiliency and Stability

Today's enterprises rely on Information Technology resources and applications to access business-critical information, and for day-to-day work. A high-availability infrastructure is of paramount importance, starting with a resilient network core. The Allied Telesis expandable x900 Series switches provide the ideal solution — without the expense of a full chassis. With the benefits of high availability, increased capacity and ease of management, Virtual Chassis Stacking makes networking reliable and simple.

Using VCStack at the core of the network allows multiple switches to appear as a single virtual chassis. In normal operation, this virtual chassis acts as a single switch, simplifying management.

The diagram above shows link aggregation between the core VCStack and the edge switches.

With link aggregation across ports on different virtual chassis members, there is no perceptible disruption in the case of a link failure, and the full bandwidth of the network remains available. Fast Failover ensures absolutely minimal network downtime in the event of a problem.

VCStack and link aggregation provide a solution where network resources are spread across the virtual chassis members, ensuring device and path resiliency. Virtualization of the network core ensures access to information when you need it.

Key Solution

EPSR (Ethernet Protection Switched Ring)
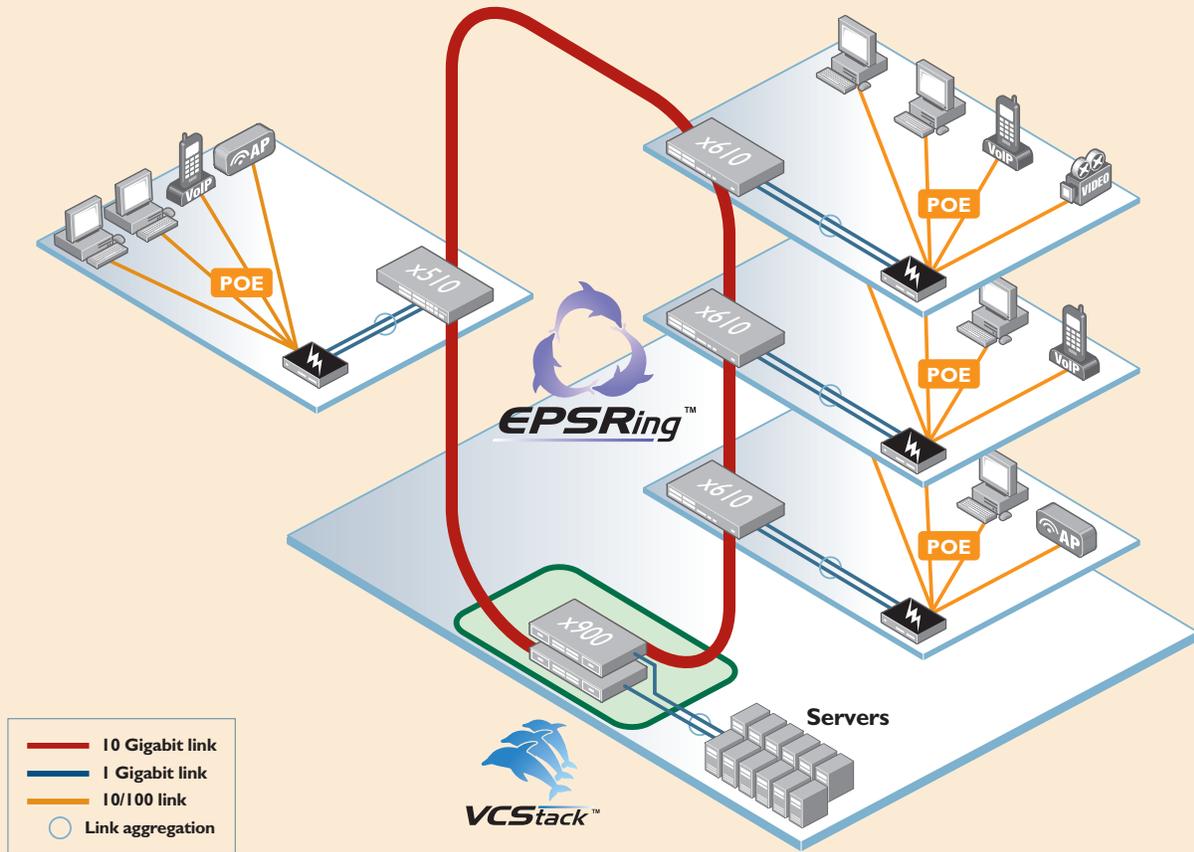
Legend:
- **10 Gigabit link**
- **1 Gigabit link**
- **10/100 link**
- ○ **Link aggregation**

EPSRing: Resiliency and Fault Tolerance

The increased convergence of services and applications in the enterprise has led to increasing demand for highly available networks with minimal downtime. High bandwidth is also required for the multiple applications simultaneously using the network. Real-time applications like surveillance, video streaming and Voice over IP (VoIP) are used alongside data and Internet access.

When a high-performing, resilient network is required for the enterprise core, using EPSR with the Allied Telesis x900 Series switches provides the ideal solution.

EPSRing creates a high-speed resilient ring that can utilize today's maximum

Ethernet standard of 10Gbps, and provide extremely fast failover between nodes. EPSR enables rings to recover within as little as 50ms, preventing a node or link failure from affecting customer experience, even with demanding applications such as IP telephony and video monitoring.

The above diagram shows a corporate network based on a central EPSR ring. The inclusion of Allied Telesis VCStack technology at the core of the network adds a further layer of resiliency, increasing the availability of critical resources.

Now that technology has made high-availability and high-bandwidth so accessible, corporate business, education providers and other enterprise network

users can enjoy the benefits that EPSRing has to offer. By ensuring always-available online applications and resources, this advanced self-healing network technology meets the constant demand for information at the fingertips.

x900 Series | Layer 3+ Network Switches

Specifications

Performance

» Forwarding Rate:
AT-x900-24X: 110.1Mpps
AT-x900-12XT/S: 62.5Mpps

» Switching Fabric:
AT-x900-24X: 168Gbps
AT-x900-12XT/S: 84Gbps

» Extensive wirespeed traffic classification for ACLs and QoS

» Supports 10KB jumbo frames

» Wirespeed multicasting

» Up to 256K IPv4 routes

» Up to 16K MAC addresses

» Up to 4K Layer 2 multicast groups

» 4K Layer 3 interfaces

» Up to 1K Layer 3 IPv4 multicast groups

» 4K VLANs

» 512MB DDR SDRAM

» 64MB flash memory

» Separate packet buffer memory

Reliability

» The x900-24X Series feature dual hot-swappable PSUs with 1 + 1 redundancy and dual feed support — a separate power circuit can feed each power supply providing extra reliability

» Hot-swappable XEMs

» Full environmental monitoring of PSUs, fans, temperature and internal voltages. SNMP traps alert network managers in case of any failure

Power Consumption
AT-x900-24X

With 1 PSU and 1 fan module:
110 Watts (375 BTU/hr)
With 2 PSUs and 2 XEM-1XP modules:
191 Watts (652 BTU/hr)

AT-x900-12XT/S

With 1 XEM-12: 104 Watts (355 BTU/hr)
With no XEM: 68 Watts (232 BTU/hr)

Power Characteristics

» AC Voltage: 100 to 240V (+/-10% auto ranging)

» Frequency: 47 to 63Hz

» DC Voltage: : 40 to 60V

Expandability

» Two high speed 60Gbps expansion bays on x900-24X

» One high speed 60Gbps expansion bay on x900-12XT/S

» Stackable up to two units in a VCStack

» IPv6 routing license option

» Advanced Layer 3 license option

Flexibility and Compatibility

» SFP ports will support any combination of 1000T, 100FX, 100BX, 1000SX, 1000LX, 1000ZX or 1000ZX CWDM SFPs (Note XEM-12Sv2 does not support 100X)

» XEM modules are compatible with SwitchBlade x908 Layer 3 modular switch

» 60Gbps expansion bays supporting a choice of XEM modules for port flexibility and application versatility

Diagnostic Tools

» Built-In Self Test (BIST)

» Find-me device locator

» Optical Digital Diagnostic Monitoring (DDM)

» Ping polling for IPv4 and IPv6

» Port mirroring

» TraceRoute for IPv4 and IPv6

General Routing

» Black hole routing

» Directed broadcast forwarding

» DNS relay

» Equal Cost Multi Path (ECMP) routing

» Policy-based routing

» Route maps

» Route redistribution (OSPF, BGP, RIP)

» UDP broadcast helper (IP helper)

» Up to 64 Virtual Routing and Forwarding (VRF Lite) domains (with license)

IPv6 Features

» 6to4 tunneling

» DHCPv6 relay, DNSv6, NTPv6

» IPv4 and IPv6 dual stack

» Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6

Management

» Allied Telesis Management Framework (AMF) enables powerful centralized management and zero-touch device installation.

» Console management port on the front panel for ease of access

» Eco-friendly mode allows ports and LEDs to be disabled to save power

» Web-based Graphical User Interface (GUI)

» Industry-standard CLI with context-sensitive help

» Out-of-band 10/100/1000T Ethernet management port

» SD/SDHC memory card socket allows software release files, configurations and other files to be stored for backup and distribution to other devices

» Powerful CLI scripting engine

» Configurable logs and triggers provide an audit trail of SD card insertion and removal

» Comprehensive SNMP MIB support for standards-based device management

» Built-in text editor

» Event-based triggers allow user-defined scripts to be executed upon selected system events

Quality of Service

» Limit bandwidth per port or per traffic class down to 64kbps

» Wirespeed traffic classification with low latency essential for VoIP and real-time streaming media applications

» Policy-based QoS based on VLAN, Port, MAC and general packet classifiers

» Policy-based storm protection

» Extensive remarking capabilities

» Taildrop for queue congestion control

» Strict priority, weighted round robin or mixed scheduling

» RED and WRED curves for sophisticated drop precedence

Resiliency Features

» Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic

» Dynamic link failover (host attach)

» EPSRing (Ethernet Protection Switched Rings) with SuperLoop Protection (SLP)

» EPSR enhanced recovery

» Loop protection mechanisms: loop detection and thrash limiting

» PVST+ compatibility mode

» STP root guard

» VCStack fast failover minimizes network disruption

Security Features

» Access Control Lists (ACLs)

» Configurable auth-fail and guest VLANs

» Authentication, Authorisation and Accounting (AAA)

» BPDU protection

» DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI)

» Dynamic VLAN assignment

» MAC address filtering and MAC address lock-down

» Network Access and Control (NAC) features manage endpoint security

» Port-based learn limits (intrusion detection)

» Private VLANs provide security and port isolation for multiple customers using the same VLAN

» Secure Copy (SCP)

» Strong password security and encryption

» Tri-authentication: MAC-based, web-based and IEEE 802.1x

Environmental Specifications

» Operating temperature range:
AT-x900-24X 0°C to 40°C (32°F to 104°F)
AT-x900-12XT/S 0°C to 50°C (32°F to 122°F)
Derated by 1°C per 305 meters (1,000 ft)

» Storage temperature range:
-30°C to 70°C (-13°F to 158°F)

» Operating relative humidity range:
5% to 80% non-condensing

» Storage relative humidity range:
5% to 95% non-condensing

» Operating altitude:
3,050 meters maximum (10,000 ft)

Electrical Approvals and Compliances

» EMC: EN55022 class A, FCC class A, VCCI class A

» Immunity: EN55024, EN61000-3-levels 2 (Harmonics), and 3 (Flicker) – AC models only

» NEBS: GR63, GR1089 level 3. AT-x900-24XT-N and AT-XEM-12S

Safety

» Standards: UL60950-1, CAN/CSA-C22.2 No. 60950-1-03, EN60950-1, EN60825-1, AS/NZS 60950.1

» Certification: UL, cUL, TUV

Restrictions on Hazardous Substances (RoHS) Compliance

» EU RoHS compliant

» China RoHS compliant

Country of Origin

» Singapore

Physical Specifications

PRODUCT	WIDTH	DEPTH	HEIGHT	MOUNTING	WEIGHT	
					UNPACKAGED	PACKAGED
AT-x900-24XT	440 mm (17.32 in)	440 mm (17.32 in)	44.5 mm (1.75 in)	1 RU	† 7.3 kg (16.09 lb) 9.3 kg (20.50 lb) max	† 8.8 kg (19.40 lb) 10.8 kg (23.80 lb) max
AT-x900-24XS	440 mm (17.32 in)	440 mm (17.32 in)	44.5 mm (1.75 in)	1 RU	† 7.3 kg (16.09 lb) 9.3 kg (20.50 lb) max	† 8.8 kg (19.40 lb) 10.8 kg (23.80 lb) max
AT-x900-12XT/S	440 mm (17.32 in)	350 mm (13.77 in)	44.5 mm (1.75 in)	1 RU	5.3 kg (11.68 lb) no XEM 6.0 kg (13.22 lb) with XEM	7.9 kg (17.41 lb) no XEM 8.6 kg (18.95 lb) with XEM
AT-PWR01	-	-	-	N/A	AC - 1 kg (2.20 lb) DC - 1 kg (2.20 lb)	AC - 1.8 kg (3.96 lb) DC - 1.5 kg (3.30 lb)
AT-FAN01	-	-	-	N/A	0.6 kg (1.32 lb)	1.4 kg (3.08 lb)
AT-XEM-12T	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-12S	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-12Sv2*	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-12Tv2*	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-24T**	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-STK	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-1XP	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-2XP	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-2XS	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-2XT	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)

† with 1 PSU and I fan module   * Require AlliedWare Plus software release 5.4.2 - 2.5 or later   ** Require AlliedWare Plus software release 5.4.3 - 2.5 or later

Latency (microseconds)

PRODUCT	PORT SPEED			
	10 MBPS	100 MBPS	1 GBPS	10 GBPS
AT-x900-24XT	86.7µs	13.1µs	6.3µs	3.9µs*
AT-x900-24XS	89.1µs	13.5µs	6.4µs	3.9µs*
AT-x900-12XT/S	84.4µs	12.7µs	6.2µs	3.9µs*

* with XEM-2XP

Standards and Protocols

AlliedWare Plus Operating System
Version 5.4.3

Authentication
RFC 1321   MD5 Message-Digest algorithm
RFC 1828   IP authentication using keyed MD5

Border Gateway Protocol (BGP)
BGP dynamic capability
BGP outbound route filtering
RFC 1772   Application of the Border Gateway Protocol (BGP) in the Internet
RFC 1997   BGP communities attribute
RFC 2385   Protection of BGP sessions via the TCP MD5 signature option
RFC 2439   BGP route flap damping
RFC 2858   Multiprotocol extensions for BGP-4
RFC 2918   Route refresh capability for BGP-4
RFC 3392   Capabilities advertisement with BGP-4
RFC 4271   Border Gateway Protocol 4 (BGP-4)
RFC 4360   BGP extended communities
RFC 4456   BGP route reflection - an alternative to full mesh iBGP
RFC 4724   BGP graceful restart
RFC 4893   BGP support for four-octet AS number space
RFC 5065   Autonomous system confederations for BGP

Encryption
FIPS 180-1   Secure Hash standard (SHA-1)
FIPS 186   Digital signature standard (RSA)
FIPS 46-3   Data Encryption Standard (DES and 3DES)

Ethernet
IEEE 802.1AX Link aggregation (static and LACP)
IEEE 802.2   Logical Link Control (LLC)
IEEE 802.3   Ethernet
IEEE 802.3ab 1000BASE-T
IEEE 802.3ad Static and dynamic link aggregation
IEEE 802.3ae 10 Gigabit Ethernet
IEEE 802.3an 10GBASE-T
IEEE 802.3az Energy Efficient Ethernet (EEE)
IEEE 802.3u   100BASE-X
IEEE 802.3x   Flow control - full duplex operation
IEEE 802.3z   1000BASE-X

General Routing
RFC 768   User Datagram Protocol (UDP)
RFC 791   Internet Protocol (IP)
RFC 792   Internet Control Message Protocol (ICMP)
RFC 793   Transmission Control Protocol (TCP)
RFC 826   Address Resolution Protocol (ARP)
RFC 894   Standard for the transmission of IP datagrams over Ethernet networks
RFC 919   Broadcasting Internet datagrams
RFC 922   Broadcasting Internet datagrams in the presence of subnets
RFC 932   Subnetwork addressing scheme
RFC 950   Internet standard subnetting procedure
RFC 951   Bootstrap Protocol (BootP)
RFC 1027   Proxy ARP
RFC 1035   DNS client
RFC 1042   Standard for the transmission of IP datagrams over IEEE 802 networks
RFC 1071   Computing the Internet checksum
RFC 1122   Internet host requirements
RFC 1191   Path MTU discovery

RFC 1256   ICMP router discovery messages
RFC 1518   An architecture for IP address allocation with CIDR
RFC 1519   Classless Inter-Domain Routing (CIDR)
RFC 1542   Clarifications and extensions for BootP
RFC 1591   Domain Name System (DNS)
RFC 1812   Requirements for IPv4 routers
RFC 1918   IP addressing
RFC 2581   TCP congestion control

IPv6 Features
RFC 1981   Path MTU discovery for IPv6
RFC 2460   IPv6 specification
RFC 2464   Transmission of IPv6 packets over Ethernet networks
RFC 3056   Connection of IPv6 domains via IPv4 clouds
RFC 3484   Default address selection for IPv6
RFC 3596   DNS extensions to support IPv6
RFC 4007   IPv6 scoped address architecture
RFC 4193   Unique local IPv6 unicast addresses
RFC 4291   IPv6 addressing architecture
RFC 4443   Internet Control Message Protocol (ICMPv6)
RFC 4861   Neighbor discovery for IPv6
RFC 4862   IPv6 Stateless Address Auto-Configuration (SLAAC)
RFC 5014   IPv6 socket API for source address selection
RFC 5095   Deprecation of type 0 routing headers in IPv6
RFC 5175   IPv6 Router Advertisement (RA) flags option
RFC 6105   IPv6 Router Advertisement (RA) guard

Management
AT Enterprise MIB
SNMPv1, v2c and v3
IEEE 802.1AB Link Layer Discovery Protocol (LLDP

RFC 1155	Structure and identification of management information for TCP/IP-based Internets
RFC 1157	Simple Network Management Protocol (SNMP)
RFC 1212	Concise MIB definitions
RFC 1213	MIB for network management of TCP/IP-based Internets: MIB-II
RFC 1215	Convention for defining traps for use with the SNMP
RFC 1227	SNMP MUX protocol and MIB
RFC 1239	Standard MIB
RFC 1724	RIPv2 MIB extension
RFC 2011	SNMPv2 MIB for IP using SMIv2
RFC 2012	SNMPv2 MIB for TCP using SMIv2
RFC 2013	SNMPv2 MIB for UDP using SMIv2
RFC 2096	IP forwarding table MIB
RFC 2578	Structure of Management Information v2 (SMIv2)
RFC 2579	Textual conventions for SMIv2
RFC 2580	Conformance statements for SMIv2
RFC 2674	Definitions of managed objects for bridges with traffic classes, multicast filtering and VLAN extensions
RFC 2741	Agent extensibility (AgentX) protocol
RFC 2787	Definitions of managed objects for VRRP
RFC 2819	RMON MIB (groups 1,2,3 and 9)
RFC 2863	Interfaces group MIB
RFC 3164	Syslog protocol
RFC 3176	sFlow: a method for monitoring traffic in switched and routed networks
RFC 3411	An architecture for describing SNMP management frameworks
RFC 3412	Message processing and dispatching for the SNMP
RFC 3413	SNMP applications
RFC 3414	User-based Security Model (USM) for SNMPv3
RFC 3415	View-based Access Control Model (VACM) for SNMP
RFC 3416	Version 2 of the protocol operations for the SNMP
RFC 3417	Transport mappings for the SNMP
RFC 3418	MIB for SNMP
RFC 3635	Definitions of managed objects for the Ethernet-like interface types
RFC 3636	IEEE 802.3 MAU MIB
RFC 4188	Definitions of managed objects for bridges
RFC 4318	Definitions of managed objects for bridges with RSTP
RFC 4560	Definitions of managed objects for remote ping, traceroute and lookup operations
RFC 6527	Definitions of managed objects for VRRPv3

Multicast Support
Bootstrap Router (BSR) mechanism for PIM-SM
IGMP query solicitation
IGMP snooping
IGMP/MLD multicast forwarding (IGMP/MLD proxy)
MLD snooping (v1 and v2)
PIM for IPv6

RFC 1112	Host extensions for IP multicasting
RFC 2236	Internet Group Management Protocol v2 (IGMPv2)
RFC 2710	Multicast Listener Discovery (MLD) for IPv6
RFC 2715	Interoperability rules for multicast routing protocols
RFC 3376	IGMPv3
RFC 3810	Multicast Listener Discovery v2 (MLDv2) for IPv6
RFC 3973	PIM Dense Mode (DM)
RFC 4541	IGMP and MLD snooping switches
RFC 4601	Protocol Independent Multicast - Sparse Mode (PIM-SM): protocol specification (revised)
RFC 4604	Using IGMPv3 and MLDv2 for source-specific multicast
RFC 4607	Source-specific multicast for IP

Open Shortest Path First (OSPF)
OSPF link-local signaling
OSPF MD5 authentication
OSPF restart signaling
Out-of-band LSDB resync

RFC 1245	OSPF protocol analysis
RFC 1246	Experience with the OSPF protocol
RFC 1370	Applicability statement for OSPF
RFC 1765	OSPF database overflow
RFC 2328	OSPFv2
RFC 2370	OSPF opaque LSA option
RFC 2740	OSPFv3 for IPv6
RFC 3101	OSPF Not-So-Stubby Area (NSSA) option
RFC 3509	Alternative implementations of OSPF area border routers
RFC 3623	Graceful OSPF restart
RFC 3630	Traffic engineering extensions to OSPF
RFC 4552	Authentication/confidentiality for OSPFv3
RFC 5329	Traffic engineering extensions to OSPFv3

Quality of Service (QoS)
IEEE 802.1p Priority tagging

RFC 2211	Specification of the controlled-load network element service
RFC 2474	DiffServ precedence for eight queues/port
RFC 2475	DiffServ architecture
RFC 2597	DiffServ Assured Forwarding (AF)
RFC 2697	A single-rate three-color marker
RFC 2698	A two-rate three-color marker
RFC 3246	DiffServ Expedited Forwarding (EF)

Resiliency Features
IEEE 802.1D MAC bridges
IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
RFC 5798 Virtual Router Redundancy Protocol version 3 (VRRPv3) for IPv4 and IPv6

Routing Information Protocol (RIP)
RFC 1058	Routing Information Protocol (RIP)
RFC 2080	RIPng for IPv6
RFC 2081	RIPng Protocol Applicability Statement
RFC 2082	RIP-2 MD5 Authentication
RFC 2453	RIPv2

Security Features
SSH remote login
SSLv2 and SSLv3
TACACS+ authentication and accounting
IEEE 802.1X authentication protocols (TLS, TTLS, PEAP and MD5)

IEEE 802.1X multi-supplicant authentication
IEEE 802.1X port-based network access control

RFC 2246	TLS protocol v1.0
RFC 2865	RADIUS
RFC 2866	RADIUS accounting
RFC 2868	RADIUS attributes for tunnel protocol support
RFC 3546	Transport Layer Security (TLS) extensions
RFC 3579	RADIUS support for Extensible Authentication Protocol (EAP)
RFC 3580	IEEE 802.1x RADIUS usage guidelines
RFC 3748	PPP Extensible Authentication Protocol (EAP)
RFC 4251	Secure Shell (SSHv2) protocol architecture
RFC 4252	Secure Shell (SSHv2) authentication protocol
RFC 4253	Secure Shell (SSHv2) transport layer protocol
RFC 4254	Secure Shell (SSHv2) connection protocol

Services
RFC 854	Telnet protocol specification
RFC 855	Telnet option specifications
RFC 857	Telnet echo option
RFC 858	Telnet suppress go ahead option
RFC 1091	Telnet terminal-type option
RFC 1350	Trivial File Transfer Protocol (TFTP)
RFC 1985	SMTP service extension
RFC 2049	MIME
RFC 2131	DHCPv4 (server, relay and client)
RFC 2132	DHCP options and BootP vendor extensions
RFC 2554	SMTP service extension for authentication
RFC 2616	Hypertext Transfer Protocol - HTTP/1.1
RFC 2821	Simple Mail Transfer Protocol (SMTP)
RFC 2822	Internet message format
RFC 3046	DHCP relay agent information option (DHCP option 82)
RFC 3315	DHCPv6 (server, relay and client)
RFC 3633	IPv6 prefix options for DHCPv6
RFC 3646	DNS configuration options for DHCPv6
RFC 3993	Subscriber-ID suboption for DHCP relay agent option
RFC 4330	Simple Network Time Protocol (SNTP) version 4
RFC 5905	Network Time Protocol (NTP) version 4

VLAN Support
Generic VLAN Registration Protocol (GVRP)
IEEE 802.1ad Provider bridges (VLAN stacking, Q-in-Q)
IEEE 802.1Q Virtual LAN (VLAN) bridges
IEEE 802.1v VLAN classification by protocol and port
IEEE 802.3ac VLAN tagging

Voice over IP (VoIP)
LLDP-MED ANSI/TIA-1057
Voice VLAN

Ordering Information

Feature Licenses

NAME	DESCRIPTION	INCLUDES
AT-FL-X900-01	x900 Advanced Layer 3 license	» OSPF[1] » BGP4 » PIMv4-SM, DM & SSM » VLAN double tagging (Q-in-Q) » VRF Lite
AT-FL-X900-02	x900 IPv6 pack	» RIPng » MLDv1 & v2 » PIMv6-SM » OSPFv3
AT-FL-RADIUS-FULL	Increase local RADIUS server support limits[2]	» 5000 users » 1000 NAS

[1] 64 OSPF routes included in base software
[2] 100 users and 24 NAS can be stored in local RADIUS database with base software

x900 Series | Layer 3+ Network Switches

Ordering Information

x900 Series

AT-x900-24XT-xx
24 x 10/100/1000T (RJ-45) copper ports,
2 x high speed expansion bays, removable PSU

AT-x900-24XT-N-85
24 x 10/100/1000T (RJ-45) NEBS compliant,
2 x high speed expansion bays, removable PSU

AT-x900-24XS-xx
24 x 10/100/1000X SFP combo ports,
2 x high speed expansion bays, removable PSU

AT-x900-12XT/S-yy
12 x 1000T combo ports, 1 x high speed expansion
bay, internal PSU

Expansion Modules

AT-XEM-1XP
1 x 10GbE XFP port

AT-XEM-2XP
2 x 10GbE XFP ports

AT-XEM-2XS
2 x 10GbE SFP+ ports

AT-XEM-2XT
2 x 10GbE (RJ-45) ports

AT-XEM-12S
12 x 100/1000X SFP ports

AT-XEM-12T
12 x 10/100/1000T (RJ-45) ports

AT-XEM-12Sv2
12 x 1000X SFP ports

AT-XEM-12Tv2
12 x 10/100/1000T (RJ-45) ports

AT-XEM-24T
24 x 10/100/1000T (RJ Point 5) ports

AT-XEM-STK
2 x high speed stacking ports
(stacking cable sold separately)

10GbE SFP+ Modules
For use with XEM-2XS

AT-SP10SR
10GSR 850 nm short-haul, 300 m with MMF

AT-SP10LR
10GLR 1310 nm medium-haul, 10 km with SMF

SFP Modules

AT-SPFX/2
100FX multi-mode 1310 nm fiber up to 2 km
AT-SPFX/15
100FX single-mode 1310 nm fiber up to 15 km

AT-SPFXBD-LC-13
100BX Bi-Di (1310 nm Tx, 1550 nm Rx) fiber up to
10 km

AT-SPFXBD-LC-15
100BX Bi-Di (1550 nm Tx, 1310 nm Rx) fiber up to
10 km

AT-SPTX[3]
1000T 100 m copper

AT-SPSX
1000SX GbE multi-mode 850 nm fiber up to 550 m

AT-SPSX/I
1000SX GbE multi-mode 850 nm fiber up to 550 m
industrial temperature

AT-SPEX
1000X GbE multi-mode 1310 nm fiber up to 2 km

AT-SPLX10
1000LX GbE single-mode 1310 nm fiber up to 10 km

AT-SPLX10/I
1000LX GbE single-mode 1310 nm fiber up to 10 km
industrial temperature

AT-SPBD10-13
1000LX GbE Bi-Di (1310 nm Tx, 1490 nm Rx)
fiber up to 10 km

AT-SPBD10-14
1000LX GbE Bi-Di (1490 nm Tx, 1310 nm Rx)
fiber up to 10 km

AT-SPLX40
1000LX GbE single-mode 1310 nm fiber up to 40 km

[3] The AT-SPTX is not supported on the AT-x900-12XT/S

AT-SPZX80
1000ZX GbE single-mode 1550 nm fiber up to 80 km

10GbE XFP Modules
For use with XEM-1XP and XEM-2XP

AT-XPSR
10G-SR 850 nm short-haul, 300 m with MMF

AT-XPLR
10G-LR 1310 nm medium-haul, 10 km with SMF

AT-XPER40
10G-ER 1550 nm long-haul, 40 km with SMF

10GbE SFP+ Cables
For use with XEM-2XS

AT-SP10TW1
1 meter SFP+ direct attach cable

AT-SP10TW3
3 meter SFP+ direct attach cable

AT-SP10TW7
7 meter SFP+ direct attach cable

RJ.5 to RJ45 Cables
For use with XEM-24T

AT-UTP/RJ.5-100-A-008
RJ.5 to RJ45 1m Ethernet cables (pack of 8)

AT-UTP/RJ.5-300-A-008
RJ.5 to RJ45 3m Ethernet cables (pack of 8)

Stacking Cables
For use with XEM-STK

AT-XEM-STK-CBL350
350 mm stacking cable

AT-XEM-STK-CBL2.0
2.0 meter stacking cable

Power Supplies

AT-PWR01-xx
Hot-swappable load sharing power supply

AT-FAN01
Fan only module

Where xx = 20 for no power cord
60 for all power cords
80 for 48VDC power supply
Where yy = 20 for no power cord
60 for all power cords